**Unit Two: Physical Science**

**I. Forces and Motion**

**A. Force** - push or pull

**1.** A force can cause an object to speed up, to slow

down; to change direction, or to stop moving.

**2. Gravity** - force that is always working on objects on Earth. It is the force

that pulls us and everything around us toward the center of the Earth.

**3. Gravitation** is different than gravity. It is the universal pull of all objects

on one another, causing them to move closer together.

**a.** Objects with larger masses have a greater pull.

**b.** As distance between objects increases, gravitational pull

decreases.

**c.** All force is measured in **newtons**.

**B. Motion** is measured by the change of position of an object.

**1. Speed** - measure of how far something moves during a certain

period of time.

**a.** Speed = distance divided by time

**b.** Students should be able to recognize the difference between

constant and average speeds.

**2. Velocity** - speed of an object with a given direction

**3. Acceleration** - rate of change in velocity. This can

be a change in speed or direction or both

**4. Momentum** - mass times velocity

**II. Newton's Laws of Motion**

**A. History**

**1.** Over three hundred years before Christ, Aristotle

wrote that moving objects need a push or pull to

keep in motion.

**2.** Four hundred years ago, Galileo showed that moving object would keep

moving in a straight line without a push or pull until something interfered

with its motions.

**3.** Newton developed Galileo's laws into three laws of motion. His laws

describe gravity, other forces, and the ways that objects in motion

affect one another

**B. Newton's Laws of Motion**

**1. First Law** - An object at rest tends to stay at rest and an object in

motion tends to stay in motion in a straight line until an outside force

acts on it.

**a.** When you pedal a bicycle it moves, when you stop, it stops.

**b.** A ball changes direction when it is hit by a bat.

**2. Second Law** - The acceleration of an object depends on the mass of

an object and the size of the net force supplied to it.

Force = mass times acceleration.

**a.** It is easier to push an empty box than a full one.

**b.** A wagon with ten books is more difficult to pull than one with five

books.

**3. Third Law** - For every action force, there is an equal and opposite

reaction force.

**a.** When children who are facing each other push off from one

another, they move backwards.

**b.** It would be unwise to jump to a dock from an untied boat

because the boat would float away from the dock.

**4.** The study of Newton's Laws is enhanced by the addition of student

inquiries and investigations.

**C. How Forces Interact**

**1. Friction** - force that opposes motion whenever two surfaces rub against

each other.

**a.** Causes heat

**b.** Slows objects down

**2. Balanced Forces** - equal in size, opposite in direction. There is no

change in motion with balanced forces.

**3. Unbalanced Forces** - unequal in size, similar in direction.

Unbalanced forces will cause an object at rest to move.

Unbalanced forces will also cause an object in motion to

slow down or stop.